

FORM PTO-1390

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY DOCKET NUMBER
LSP-0016

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

U.S. APPLICATION NO. (if known) 37 C.F.R. 1.5)

10/031977

INTERNATIONAL APPLICATION NO.
PCT/EP00/07151

INTERNATIONAL FILING DATE
26 July 2000

PRIORITY DATE CLAIMED
29 July 1999

TITLE OF INVENTION METHOD FOR POWER OPTIMIZATION IN A VEHICLE/TRAIN HAVING A NUMBER OF DRIVE SYSTEMS

APPLICANT(S) FOR DO/EO/US Franke RUDIGER, Peter TERWIESCH, Markus MEYER, Christian KLOSE and Karl-Hermann KETTELER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) 35 U.S.C. 371(c)(4).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

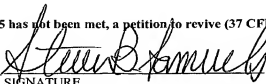
Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A FIRST preliminary amendment.
☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:
 - A copy of the Published PCT Application by WIPO under No. WO 01/08958, including the search report.
 - A copy of the International Preliminary Examination report, including amended claim 1 under Article 34.
 - An English translation of the Response to the Written Opinion.

EXPRESS MAIL Mailing Label No. EL 899365920 US
Date of Deposit: 24 January 2002

EL899365920US

5370606CIR: 23 JAN 2002

U.S. APPLICATION NO. 107031971 INTERNATIONAL APPLICATION NO. PCT/EP00/07151	ATTORNEY DOCKET NUMBER LSP-0016							
17. The following fees are submitted: Basic National Fee (37 CFR 1.492(a)(1) - (5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO..... \$1,040.00 International preliminary examination fee (37 CFR 1.482 not paid to USPTO but International Search Report has been prepared by the EPO or JPO..... \$890.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO..... \$740.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4)..... \$710.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4)..... \$100.00	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center;">CALCULATIONS</td> <td style="text-align: center;">PTO USE ONLY</td> </tr> <tr> <td colspan="3" style="height: 100px;"></td> </tr> </table>		CALCULATIONS		PTO USE ONLY			
CALCULATIONS		PTO USE ONLY						
ENTER APPROPRIATE BASIC FEE AMOUNT =	\$890.00							
Surcharge of \$130.00 for furnishing the oath or declaration later than <u>20</u> <u>30</u> months from the earliest claimed priority date (37 CFR 1.492(e)).								
Claims	Number Filed	Number Extra						
Total claims	- 20 =	X \$18.00						
Independent Claims	- 3 =	x \$84.00						
Multiple dependent claims(s) (if applicable)		+ \$280.00						
TOTAL OF ABOVE CALCULATIONS =								
Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.								
SUBTOTAL =								
Processing fee of \$130.00 for furnishing the English translation later than <u>20</u> <u>30</u> months from the earliest claimed priority date (37 CFR 1.492(f)).								
TOTAL NATIONAL FEE =								
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property								
TOTAL FEES ENCLOSED =								
		Amount to be:						
		refunded \$						
		charged \$						
a. <input checked="" type="checkbox"/> A check in the amount of \$ 890.00 to cover the above fee is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. 23-3050 in the amount of \$_____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input type="checkbox"/> The Commissioner if hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 23-3050. A duplicate copy of this sheet is enclosed.								
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.								
SEND ALL CORRESPONDENCE TO: Steven B. Samuels Woodcock Washburn LLP One Liberty Place - 46th Floor Philadelphia, PA 19103 (215) 568-3100								
SIGNATURE  Steven B. Samuels								
NAME 37,711 REGISTRATION NUMBER								

2/PRTS

10/031977
531 Rec'd PCT/JP 23 JAN 2002

Method for power optimization in a vehicle/train having
a number of drive systems

Description

5

The invention relates to a method for power optimization in a vehicle/train according to the preamble of claim 1.

10 During the planning of journeys and the drafting of schedules for rail traffic, time reserves for unforeseen events and adverse operating conditions are included in the plans. Since, during real journeys, the operating conditions are typically more favorable than
15 those assumed during planning, the time reserves created by this are available for other purposes. A particularly practical use of the time reserves resides in the saving of power by means of a suitable travel mode.

20

Previously known and used methods for power minimization are mostly based on the assumption that a travel mode comprising the constituents maximum acceleration - travel at constant speed - coasting -
25 maximum retardation is optimum in power terms. In this case, the mechanical tractive power which is needed to accelerate the vehicle is minimized. For verification, a linear dynamic train model is used, in particular no account being taken of any term which describes the
30 quadratic relationship between speed and travel resistance.

In DD 255 132 A1, this basic assumption is expanded by subdividing a total route into a number of sections, so
35 that in each section the slope resistance of the journey is constant.

In EP 0 467 377 B1, the subdivision of the overall route into a number of sections is introduced in such a

- 2 -

way that in each section the permissible maximum speed is constant. The travel mode comprising the constituents maximum acceleration - travel at constant speed - maximum retardation is repeated in each
5 section. Coasting is therefore dispensed with.

EP 0 755 840 A1 does not describe a practical method for power optimization but instead explains a general system structure with which power optimization can also
10 be implemented. A cycle comprising acceleration - travel at constant speed - retardation and braking is listed as an example.

The invention is based on the object of specifying an
15 improved method for power optimization with regard to the time reserves included in the planning of a schedule of a vehicle/train.

This object is achieved, in conjunction with the
20 preamble, by the features specified in claim 1.

The advantage that can be achieved with the invention is in particular that, by taking into account the distribution of the drive equipment and multiple
25 traction in the optimization algorithm, instead of the mechanical tractive power the power which is primarily used, such as the electrical power in the case of electric rail vehicles, is minimized.

30 Advantageous refinements of the invention are identified in the subclaims.

Further advantages of the proposed method emerge from the following description.

35 The invention will be explained in more detail below using the exemplary embodiments that are illustrated in the drawings and in which:

Fig. 1 shows a characteristic map of the power loss of a typical electric locomotive, and

5 Fig. 2 shows a characteristic map of the power loss of a typical electric locomotive with two separately controlled drive systems.

The nub of the invention is to be seen in the fact that the distribution of the drive equipment and the
10 multiple traction are taken into account in the optimization problem with regard to the time reserves included in the planning of a schedule of a vehicle/train. Here, the problem of power minimization is formulated as a mathematical optimization problem
15 and solved by a suitable, generally known optimization algorithm.

Suitable optimization algorithms are known, for example, from Papageorgiou: Optimierung [Optimization],
20 Chapters 10, 19 and in particular 20, Oldenbourg Verlag, 1996.

Accordingly, it is assumed that more than one autonomous drive system is available in order to
25 provide the total drive power of a vehicle/train. For example, a typical electric locomotive normally has two bogies, each of which is equipped with separate drives. In addition, designs with three bogies with separate drives are known, as are bogie-less vehicles with two
30 or more driven axles.

In the case of simple traction, in which only one traction vehicle performs the transport, the number of possible separate and autonomous drive systems depends.
35 on the circuit topography of the traction vehicle. In the case of electric locomotives, the circuit topography comprises, for example, in addition to the actual drives (motors), -primarily further components of the high-voltage equipment and auxiliary equipment, so-

- 4 -

called drive components. In the case of multiple traction, at least two traction vehicles in the composite train are involved in the transport of the train. Likewise, a number of concentrated or distributed drive units can be integrated into one drive train. Here, too, the circuit topography and the number of drive trains coupled in the composite train decide the number of possible separate and autonomous drive systems.

According to the invention, provision is made to take into account a number of completely or partially autonomous drive systems for power minimization with regard to the time reserves included in the planning of a schedule of a vehicle/train, it being possible for each of the drive systems to be characterized using separate functions of efficiency or power loss. When including the distribution of the drive equipment and multiple traction, three procedures are proposed, which can be used individually or in combination.

According to a first procedure, the functions of efficiency or of power loss of the individual autonomous drive systems are combined during preprocessing to form an overall function of the efficiency or the power loss of the vehicle/train. Further optimization is then identical with the optimization for a concentrated system, that is to say a system having only one single autonomous drive system.

According to a second procedure, a representative function (average function) of efficiency or power loss of an autonomous drive system is taken into account in the optimization together with the number of autonomous drive systems respectively used. This procedure is particularly expedient if the efficiency or power loss of the autonomous drive systems do not differ excessively from one another.

- 5 -

According to a third procedure, for each autonomous drive system, a function of efficiency or power loss and the binary state information ON or OFF (that is to say the actions of switching the individual autonomous drive systems on/off) are taken into account in the optimization. This procedure is particularly expedient if the efficiency or power loss of the autonomous drive systems are different to a greater extent.

While, in the case of the third procedure, there is already a plan of use for each individual autonomous drive system in the result of the optimization, in the case of the first two procedures, this has to be drawn up further through post-processing.

By taking into account the distribution of autonomous drive systems, the optimum combination of the individual drives can be determined for each traveling situation and set in a predictive way. At the same time, boundary conditions, such as the tractive and braking forces to be expected, adhesion coefficient, temperatures in the drive components and time influences in the drive dynamics, are taken into account. Furthermore, switching-on and switching-off losses can be minimized, whilst simultaneously taking into account the further losses of the vehicle.

Fig. 1 shows a characteristic map of the power loss as a function of the tractive force and the speed of a drive system of a typical electric locomotive.

Fig. 2 shows a characteristic map, put together to accord with the first procedure, of the power loss (overall function) as a function of the tractive force and the speed of a typical electric locomotive, including switching off an autonomous drive system of a bogie in the lower output range.

Patent Claims

1. A method for power optimization in a vehicle/train, using time reserves which are included when planning a schedule, wherein in order to achieve a power-saving travel mode with the aid of an optimization algorithm, the presence of a number of completely or partially autonomous drive systems is taken into account, the separate functions of efficiency or power loss of each drive system being taken into consideration.
2. The method as claimed in claim 1, wherein the separate functions of efficiency or power loss of the individual drive systems are combined during preprocessing to form an overall function of the efficiency or power loss of the vehicle/train.
3. The method as claimed in claim 1, wherein the separate functions of efficiency or power loss of the individual drive systems are combined to form a representative function of the efficiency or power loss of the drive system and are taken into account together with the number of autonomous drive systems currently used.
4. The method as claimed in claim 1, wherein, for each drive system, a separate function of efficiency or power loss, and the binary state information ON or OFF of each drive system, are taken into account.
5. The method as claimed in one of claims 1 to 4, wherein when autonomous drive systems are being selected, boundary conditions such as tractive and braking forces to be expected and/or adhesion coefficients and/or temperature and/or influences in the drive dynamics are taken into account.

10031977 1009002
10,051977

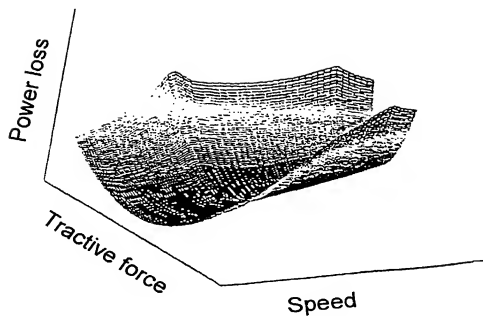


Figure 1

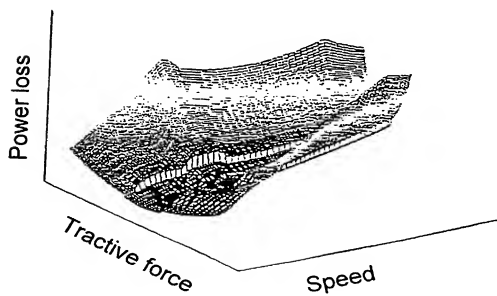


Figure 2

10/031977

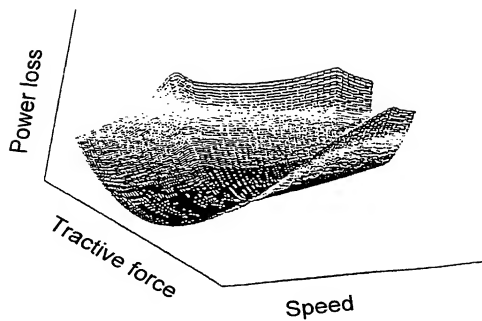


Figure 1

Abstract

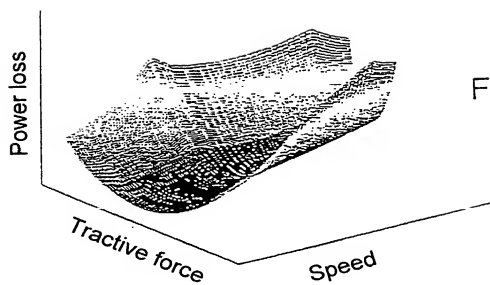


Fig. 1

Abstract

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäß Title 35, United States Code, § US-Code, § 119 (a)-(d), bzw. § 365(b) aller unten aufgeführten Auslandsanmeldungen für Patente oder Erfinderrückunden, oder § 365(a) aller PCT internationalen Anmeldungen, welche wenigstens ein Land ausser den Vereinigten Staaten von Amerika benennen, und habe nachstehend durch ankreuzen sämtliche Auslandsanmeldungen für Patente bzw. Erfinderrückunden oder PCT internationale Anmeldungen angegeben, deren Anmeldetag dem der Anmeldung, für welche Priorität beansprucht wird, vorangeht.

Prior Foreign Applications / Frühere ausländische Anmeldungen

(Number) (Nummer)	(Country) (Land)
19935353.0	Germany
PCT/EP00/07151	PCT

I hereby claim foreign priority under Title 35, 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

(Filing Date: day/month/year) (Anmeldetag : tag/monat/jahr)	Priority Not Claimed Priorität nicht beansprucht
29 July 1999	<input type="checkbox"/>
26 July 2000	<input type="checkbox"/>

Ich beanspruche hiermit Prioritätsvorteile unter Title 35, US-Code, § 119(c) aller US-Hilfsanmeldungen wie unten aufzählt.

(Application No.) (Aktenzeichen)	(Filing Date: day/month/year) (Anmeldetag : tag/monat/jahr)
-------------------------------------	--

I hereby claim the benefit under Title 35, United States Code, § 119(c) of any United States provisional application(s) listed below.

Ich beanspruche hiermit die mir unter Title 35, US-Code, § 120 zustehenden Vorteile aller unten aufgeführten US-Patentanmeldungen bzw. § 365(c) aller PCT internationalen Anmeldungen, welche die Vereinigten Staaten von Amerika benennen, und erkenne, insofern der Gegenstand eines jeden früheren Anspruchs dieser Patentanmeldung nicht in einer US-Patentanmeldung, bzw. PCT internationalen Anmeldung in in einer gemäß dem ersten Absatz von Title 35, US-Code, § 112 vorgeschriebenen Art und Weise offenbart wurde, meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Title 37, Code of Federal Regulations, § 1.56 von Belang sind und die im Zeitraum zwischen dem Anmeldetag der früheren Patentanmeldung und dem nationalen oder im Rahmen des Vertrags über die Zusammenarbeit auf dem Gebiet des Patentwesens (PCT) gültigen internationalen Anmeldetags bekannt geworden sind.

(Application No.) (Aktenzeichen)	(Filing Date: day/month/year) (Anmeldetag : tag/monat/jahr)
-------------------------------------	--

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Status) (patented, pending, abandoned)
(Status) (patentiert, schwebend, aufgegeben)

Ich erkläre hiermit, daß alle in der vorliegenden Erklärung von mir gemachten Angaben nach bestem Wissen und Gewissen der Wahrheit entsprechen, und ferner daß ich diese eidesstattliche Erklärung in Kenntnis dessen ablege, daß wissentlich und vorsätzlich falsche Angaben oder dergleichen gemäß § 1001, Title 18 des US-Code strafbar sind und mit Geldstrafe und/oder Gefängnis bestraft werden können und daß derartige wissentlich und vorsätzlich falsche Angaben die Rechtswirksamkeit der vorliegenden Patentanmeldung oder eines aufgrund deren erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

100.31977.000002

VERTRETUNGSVOLMACHT: Als benannter Erfinder beauftrage ich hiermit den (die) nachstehend aufgeführten Patentanwalt (Patentanwälte) und/oder Vertreter mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Angelegenheiten vor dem US-Patent- und Markenamt: (Name(n) und Registrationsnummer(n) auflisten)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (list name and registration number)

39
 Jason C. Abair, Reg. No. 44,007; Michael J. Bell, Reg. No. 39,604; Stephen H. Cagle, Reg. No. 26,445; Coline T. Callahan, Reg. No. 34,301; Jenny W. Chen, Reg. No. 44,604; Mary S. Consalvi, Reg. No. 32,212; Thomas E. Coverstone, Reg. No. 36,492; Ben M. Davidson, Reg. No. 38,424; James F. Davis, Reg. No. 21,072; Thomas M. Dunham, Reg. No. 39,965; Alan M. Grimaldi, Reg. No. 26,599; J. Jay Guiliano, Reg. No. 41,810; Albert P. Halluin, Reg. No. 25,227; Derek J. Jardieu, Reg. No. 44,483; Patricia A. Kammerer, Reg. No. 29,775; Christopher L. Kelly, Reg. No. 42,714; John R. Keville, Reg. No. 42,723; Brian S.Y. Kim, Reg. No. 41,114; Viola T. Kung, Reg. No. 41,131; Robert C. Laurensen, Reg. No. 34,206; Joseph P. Lavelle, Reg. No. 31,036; Don F. Livornese, Reg. No. 32,040; Craig M. Lundell, Reg. No. 30,284; Christopher A. Mathews, Reg. No. 35,944; Matthew J. Moore, Reg. No. 42,012; David P. Owen, Reg. No. 45,344; Andrew Y. Plauticia, Reg. No. 40,772; Jacobus C. Rasser, Reg. No. 37,043; Glenn W. Rhodes, Reg. No. 11,720; Michael J. Stinson, Reg. No. 45,429; Janelle D. Waack, Reg. No. 36,308; William K. West, Reg. No. 22,057; Carter J. White, Reg. No. 41,374; Adam K. Whiting, Reg. No. 44,400; Jayna R. Whitt, Reg. No. 47,175; Karen K. Wong, Reg. No. 44,402; Wallace Wu, Reg. No. 45,380; Matthew S. Zises, Reg. No. 47,246; each an attorney or agent with the law firm of Howrey Simon Arnold & White, and all other practitioners associated with Howrey Simon Arnold & White, as its attorney or agent so long as they remain with such law firm.

Postanschrift / Send Correspondence to:

David P. Owen
 Howrey Simon Arnold & White
 CityPoint, One Ropemaker Street
 London EC2Y 9HS, England

Telefonische Auskünfte: (Name und Telefonnummer) / Direct Telephone Calls to: (name and telephone number)

David P. Owen
 011 44 20 7628 3303 (please note: this is a telephone number is in London, England)

Vor- und Zuname des einzigen oder ersten Erfinders/Full name of sole or first inventor:

RUDIGER FRANKE

Unterschrift des einzigen oder ersten Erfinders / Inventor's signature:

Date: 16.7.2002

Rudiger Franke

Datum /

Wohnsitz / Residence: Fritz-Frey-Strasse, 2 D-69121, Heidelberg, Germany

DEX

Staatsangehörigkeit / Citizenship: DE

Postanschrift / Post Office Address: Same as above

Vor- und Zuname des zweiten Erfinders (falls zutreffend) / Full name of second joint inventor, if any:

PETER TERWIESCH

Unterschrift des zweiten Erfinders / Second inventor's signature:

Datum / Date:

Wohnsitz / Residence: Gartenweg 459, CH-5512 Wohlenschwil, Switzerland

Staatsangehörigkeit / Citizenship: CH

Postanschrift / Post Office Address: Same as above

3003427.090002

—VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den (die) nachstehend aufgeführten Patentanwalt (Patentanwälte) und/oder Vertreter mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Angelegenheiten vor dem US-Patent- und Markenamt: (Name(n) und Registrationsnummer(n) auflisten)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (list name and registration number)

Jason C. Abair, Reg. No. 44,007; Michael J. Bell, Reg. No. 39,604; Stephen H. Cagle, Reg. No. 26,443; Celine T. Callahan, Reg. No. 34,301; Jenny W. Chen, Reg. No. 44,604; Mary S. Consalvi, Reg. No. 32,212; Thomas E. Coverstone, Reg. No. 36,492; Ben M. Davidson, Reg. No. 38,424; Jaimes F. Davis, Reg. No. 21,072; Thomas M. Dunham, Reg. No. 39,965; Alan M. Grimaldi, Reg. No. 26,599; J. Jay Guiliano, Reg. No. 41,810; Albert P. Halluin, Reg. No. 25,227; Derek J. Jardieu, Reg. No. 44,483; Patricia A. Kammerer, Reg. No. 29,773; Christopher L. Kelley, Reg. No. 42,714; John R. Keville, Reg. No. 42,723; Brian S.Y. Kim, Reg. No. 41,114; Viola T. Kung, Reg. No. 41,131; Robert C. Laurensen, Reg. No. 34,206; Joseph P. Lavelle, Reg. No. 31,036; Don F. Livornese, Reg. No. 32,040; Craig M. Lundell, Reg. No. 30,284; Christopher A. Mathews, Reg. No. 35,944; Matthew J. Moore, Reg. No. 42,012; David P. Owen, Reg. No. 43,344; Andrew Y. Piatnicia, Reg. No. 40,772; Jacobus C. Rasser, Reg. No. 37,043; Glenn W. Rhodes, Reg. No. 31,790; Michael J. Stimson, Reg. No. 45,429; Janelle D. Waack, Reg. No. 36,300; William K. West, Reg. No. 22,037; Carter J. White, Reg. No. 41,374; Adam K. Whiting, Reg. No. 44,400; Jayna R. Whit, Reg. No. 47,175; Karen K. Wong, Reg. No. 44,409; Wallace Wu, Reg. No. 45,380; Matthew S. Zises, Reg. No. 47,246; each an attorney or agent with the law firm of Howrey Simon Arnold & White, and all other practitioners associated with Howrey Simon Arnold & White, as its attorney or agent so long as they remain with such law firm.

Postanschrift / Send Correspondence to:

David P. Owen
Howrey Simon Arnold & White
CityPoint, One Ropemaker Street
London EC2Y 9HS, England

Telefonische Auskünfte: (Name und Telefonnummer) / Direct Telephone Calls to: (name and telephone number)

David P. Owen
011 44 20 7628 3303 (please note: this is a telephone number in London, England)

Vor- und Zuname des einzigen oder ersten Erfinders/Full name of sole or first inventor:	
RUDIGER FRANKE	
Unterschrift des einzigen oder ersten Erfinders / Inventor's signature: Date:	Datum /
Wohnsitz / Residence: Fritz-Frey-Strasse, 2 D-69121, Heidelberg, Germany	
Staatsangehörigkeit / Citizenship: DE	
Postanschrift / Post Office Address: Same as above	
Vor- und Zuname des zweiten Erfinders (falls zutreffend) / Full name of second joint inventor, if any:	
PETER TERWIESCH	
Unterschrift des zweiten Erfinders / Second inventor's signature: Date:	Datum / Date: 2002-06-12
Wohnsitz / Residence: Gartenweg 459, CH-5512 Wohlenschwil, Switzerland CHX	
Staatsangehörigkeit / Citizenship: CH DE	
Postanschrift / Post Office Address: Same as above	

10031977.091002

Vor- und Zuname des dritten Erfinders (falls zutreffend) / Full name of third joint inventor, if any:

MARKUS MEYER

Unterschrift des dritten Erfinders / Third inventor's signature:

Datum / Date: 7.6.2002

Wohnsitz / Residence: Hochweidstrasse 7, CH-6030 Ebikon, Switzerland

Staatsangehörigkeit / Citizenship: CH

Postanschrift / Post Office Address: Same as above

Vor- und Zuname des vierten Erfinders (falls zutreffend) / Full name of fourth joint inventor, if any:

CHRISTIAN KLOSE

Unterschrift des vierten Erfinders / Fourth inventor's signature:

Datum / Date:

Wohnsitz / Residence: Starweg 28, D-14771 Brandenburg a.d. Havel, Germany

Staatsangehörigkeit / Citizenship: DE

Postanschrift / Post Office Address: Same as above

Vor- und Zuname des fünften Erfinders (falls zutreffend) / Full name of fifth joint inventor, if any:

KARL-HERMANN KETTELER

Unterschrift des fünften Erfinders / Fifth inventor's signature:

Datum / Date:

Wohnsitz / Residence: Schwachelerstrasse 29, CH-5314 Kleindoltingen, Switzerland

Staatsangehörigkeit / Citizenship: CH

Postanschrift / Post Office Address: Same as above

1003197 / .090002

Vor- und Zuname des dritten Erfinders (falls zutreffend) / Full name of third joint inventor, if any:

MARKUS MEYER

Unterschrift des dritten Erfinders / Third inventor's signature:

Datum / Date:

Wohnsitz / Residence: Hochweidstrasse 7, CH-6030 Ebikon, Switzerland

Staatsangehörigkeit / Citizenship: CH

Postanschrift / Post Office Address: Same as above

Vor- und Zuname des vierten Erfinders (falls zutreffend) / Full name of fourth joint inventor, if any:

CHRISTIAN KLOSE

Unterschrift des vierten Erfinders / Fourth inventor's signature:

Datum / Date: 16.08.02

Wohnsitz / Residence: ~~Starweg 28, D-14771 Brandenburg a.d. Havel, Germany~~Hauptstraße 46,
D-14789 Unterwiesitz

Staatsangehörigkeit / Citizenship: DE

DEX

Postanschrift / Post Office Address: Same as above

Vor- und Zuname des fünften Erfinders (falls zutreffend) / Full name of fifth joint inventor, if any:

KARL-HERMANN KETTELER

Unterschrift des fünften Erfinders / Fifth inventor's signature:

Datum / Date:

Wohnsitz / Residence: Schwachelerstrasse 29, CH-5314 Kleindoltingen, Switzerland

Staatsangehörigkeit / Citizenship: CH

Postanschrift / Post Office Address: Same as above

10031977.000000

Vor- und Zuname des dritten Erfinders (falls zutreffend) / Full name of third joint inventor, if any:	
MARKUS MEYER	
Unterschrift des dritten Erfinders / Third inventor's signature:	Datum / Date:
Wohnsitz / Residence: Hochweidstrasse 7, CH-6030 Ebikon, Switzerland	
Staatsangehörigkeit / Citizenship: CH	
Postanschrift / Post Office Address: Same as above	
Vor- und Zuname des vierten Erfinders (falls zutreffend) / Full name of fourth joint inventor, if any:	
CHRISTIAN KLOSE	
Unterschrift des vierten Erfinders / Fourth inventor's signature:	Datum / Date:
Wohnsitz / Residence: Starweg 28, D-14771 Brandenburg a.d. Havel, Germany	
Staatsangehörigkeit / Citizenship: DE	
Postanschrift / Post Office Address: Same as above	
Vor- und Zuname des fünften Erfinders (falls zutreffend) / Full name of fifth joint inventor, if any:	
KARL-HERMANN KETTLER	
Unterschrift des fünften Erfinders / Fifth inventor's signature: <i>K. H. Kettler</i> <i>oe Hinder</i>	Datum / Date: <i>8.6.2002</i>
Wohnsitz / Residence: Schwachelerstrasse 29, CH-5314 Kleindöttingen, Switzerland <i>CHX</i>	
Staatsangehörigkeit / Citizenship: CH	
Postanschrift / Post Office Address: Same as above	